

# **Continuous Miner Accident**

## **Instructor's Copy**

Behavioral Research Aspects of Safety and Health Group (BRASH)  
Institute for Mining and Minerals Research (IMMR)  
University of Kentucky, Lexington, Kentucky<sup>1</sup>

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<sup>1</sup> This exercise was developed and field tested under U. S. Bureau of Mines research Contract No. H0348040. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies or recommendations of the Interior Department's Bureau of Mines or the U. S. Government.

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## Introduction

This document contains most of the materials needed to use the exercise. The main part of the document is the instructor's copy. It tells how to use the exercise, presents the objectives, the master answer sheet, the scoring key, and discussion notes to be used following the exercise. The last part of this document is three appendices. Appendix A is the exercise problem booklet. This booklet can be duplicated locally. The booklets are reusable. One is needed for every person in the classroom. Appendix B is the answer sheet. Copies of this answer sheet must have the invisible ink answers that appear in Appendix C printed on them.<sup>2</sup> Answer sheets are consumable. One is needed for each group of 3 to 5 persons who work the exercise.

## Exercise Summary

Read this section first. It determines if the exercise is appropriate for your classes. If you choose to use the exercise, examine the table of contents and review the remainder of this document.

<u>Type:</u>	Invisible ink
<u>Length:</u>	Six questions
<u>Skills:</u>	First aid Conducting a primary and secondary survey Treating a crushed chest injury and shock
<u>Location:</u>	Underground
<u>Problem:</u>	You are the continuous miner operator. You hear your helper cry out. When you stop the machine, you find Harry lying on the floor near the miner tail boom. A shuttle car operator says he saw Harry get pinned to the mine roof by the tail boom. You and the other miners on the section must figure out how to care for Harry and take him out of the mine or he may die.

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<sup>2</sup> You can do this yourself if you have the proper equipment, or you may obtain copies of preprinted answer sheets from NIOSH, Pittsburgh Research Laboratory, Pittsburgh, PA phone 412-386-5901, fax 412-386-5902 or email to [minetraining@cdc.gov](mailto:minetraining@cdc.gov).

### **How To Use This Exercise**

1. Look at the performance objectives. Decide if the exercise is relevant for your mine training class.
2. Work through the exercise with the developing pen and score your responses.
3. Read the master answer sheet for the exercise. Look at all the answers.
4. Read the "Instructor's Discussion Notes" for the exercise.
5. Become thoroughly familiar with the problem so that you can present it to your class without reading it. Put the illustrations on an overhead projector so you can use these to help explain the problem.
6. When you present the exercise to the class:
  - Give each person an exercise booklet, an answer sheet and each group of 3 to 5 persons a developing pen.
  - Demonstrate how to select and mark answers using the developing pen.
  - Go over the instructions for doing the exercise with the whole group.
  - Explain the problem making sure everyone understands the problem situation.
  - Have the class members work the exercise.
  - When the class members finish, have them figure up their score using the instructions at the end of the exercise.
  - When everyone has finished, discuss the exercise. Let class members discuss the merits of each answer. Add your own ideas.

### Performance Objectives for Continuous Miner Accident

Objective number	Capability verb(s)	Description of required performance and conditions under which it is to occur
1. FA <sup>3</sup>	Recall Apply	The elements of the primary and secondary surveys given a list of options for action
2. FA	Recall Apply	The rules that victims with suspected spinal injury should not be encouraged to sit or stand and must be immobilized before being moved (unless an emergency situation requires movement to save life)
3. FA	Recall Select	Critical methods of immobilizing and moving a victim with a possible spinal injury, given a list of options
4. FA	Evaluate	A hypothetical patient for the presence of spinal fracture, crushed chest, and shock given a list of the victim's signs and symptoms
5. FA	Choose Judge	From among alternative actions effective means of evaluating and treating an equipment injury victim given a written accident scenario

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<sup>3</sup> Skill and knowledge domain abbreviation:

FA = first aid

## Master Answer Sheet for Continuous Miner Accident

Use this answer sheet to mark your selections. Rub the developing pen gently and smoothly between the brackets. Don't scrub the pen or the message may blur. Be sure to color in the entire message once you have made a selection. Otherwise you may not get the information you need.

**Question A** (Choose only ONE unless you are told to "Try Again!")

1.    [ Harry may need immediate help. Try again! ]
2.    [ Correct! This will tell you if Harry needs immediate help. Do the next question. ]
3.    [ This could cause further injury. Try again! ]
4.    [ There are only two of you. Both may be needed to care for Harry. Try again! ]

**Question B** (Select as MANY as you think are correct.)

5.    [ This could cause further injury. ]
6.    [ Correct! You see his belly move and you can feel air move at his mouth. ]
7.    [ Correct! No bleeding is seen. ]
8.    [ Correct! Harry is moaning and swearing quietly. ]
9.    [ Correct! A rapid pulse is present. ]

**Question C** (Select as MANY as you think are correct.)

10. [ Correct! ]
11. [ Correct! It is important to begin the mine emergency procedures. ]
12. [ This could cause further injury. ]
13. [ This could cause further injury. ]
14. [ This may cause further injury. ]

**Question D** (Select as MANY as you think are correct.)

- 15. [ Correct! He says "OK", but there is no movement. ]
- 16. [ Correct! He says he feels numb. ]
- 17. [ Correct! Pulse 120 and weak. ]
- 18. [ Correct! He appears pale. ]
- 19. [ No! This could cause further injury. ]
- 20. [ Correct! Stomach area feels normal. ]
- 21. [ Correct! His lower neck spine feels deformed. ]
- 22. [ Correct! No abnormalities are seen. ]
- 23. [ Correct! Part of his left chest draws in when he inhales and moves easily when  
[ you apply gentle pressure. ]

**Question E** (Select as MANY as you think are correct.)

- 24. [ Correct! This is done. ]
- 25. [ Correct! This is done. ]
- 26. [ This could cause further injuries. ]
- 27. [ Correct! This is done. ]
- 28. [ This could cause further injuries. ]

**Question F** (Select as MANY as you think are correct.)

- 29. [ Correct! This is done. ]
- 30. [ Correct! This is done. ]
- 31. [ It is almost impossible to lift a victim lying on his side and keep the head and  
[ neck immobilized in a straight line. This could cause further injury. ]
- 32. [ Correct! This is done. ]
- 33. [ His head and neck should be immobilized first to prevent spinal injury. ]

### Finding your score

Number of "Correct" answers you colored in (1) \_\_\_\_\_

12 minus number of incorrect answers you colored in (2) \_\_\_\_\_

Add blanks one and two to get your total score (3) \_\_\_\_\_

Highest possible score = 33

Lowest possible score = 0



## **Instructor's Discussion Notes for Continuous Miner Accident**

Use the information presented here and in the problem book, your own ideas and experience, and those of the miners in your class to discuss the exercise after it is completed. Group discussion can help strengthen knowledge and skills, correct errors, and relate the exercise content to the experiences of the miners. After they have worked the exercise, miners enjoy discussing the problem. They also frequently think of better ways to respond to a problem than those listed among the answers. The purpose of the exercise is to help miners think about and remember basic knowledge and skills they may someday need to deal with a mine emergency. The discussion following the exercise can contribute to this goal and tailor the exercise content to the needs of the group.

It is helpful to show overhead transparencies of the master answer sheet during the discussion. This allows you to lead the group through the exercise and to disclose and discuss all the answers to each question. Most of the information about why particular answers are correct or incorrect is given on the master answer sheet.

The following notes are intended to provide additional information for you as you discuss the exercise with your class. Read through and think about the notes before the class. Don't read the notes to the class members. This would be boring and ineffective. Rather, incorporate the ideas you find here with your own ideas and make these points at the appropriate place in the discussion of the exercise.

**Question A** - The correct answer is 2. Assuming the accident scene is safe, first aid intervention begins with an examination of the victim. This is done in order to prevent further injuries and prioritize treatments. Since the mechanism of this particular accident suggests the possibility of a spinal injury, the victim should not be unnecessarily moved.

**Question B** - The correct answers are 6, 7, 8, and 9. The examination begins with the "primary survey". The flesh of the upper shoulder and neck (trapezius muscle) is pinched and a phrase like "Are you OK?" is shouted as a check for consciousness. If a neck spine injury is suspected, and breathing is absent, an airway is obtained using a "jaw thrust" maneuver. At this point the first-aider looks, listens and feels for breathing, and checks for the presence of a carotid pulse. If the victim does not require immediate rescue breathing or CPR, he or she should be checked for significant bleeding before proceeding.

**Question C** - The correct answers are 10 and 11. If the victim does not require immediate first aid during the primary survey, a secondary survey should be initiated to define his or her needs. Since the nature of this particular accident suggests a severe injury, steps should be taken to secure EMT help at the earliest opportunity.

**Question D** - The correct answers are 15, 16, 17, 18, 20, 21, 22, and 23. When a neck spine injury is possible, the secondary survey should begin with the question "Where does it hurt?" since, according to neurosurgeon, Martin H. Weiss, (Emergency Medicine, April 15, 1984) the conscious victim will always exhibit pain at the point of injury even though he or she may have loss of sensation below that point. Even if the victim is disoriented, signs

of pain will be elicited by gently touching the point of injury. If pain is present or if the victim is unconscious as the result of trauma, the head and neck must be immobilized before continuing with the examination. Once the head and neck are immobilized, and pulse and breathing rates are determined, the survey proceeds in a head to toe manner.

**Question E** - The correct answers are 24, 25, and 27. The secondary survey has revealed signs of a neck spine injury, crushed chest, and shock which are treated in turn by immobilization, a bulky dressing, and covering the victim with a blanket. Throughout these procedures special care should be taken so that the victim is not moved unnecessarily keeping in mind that as many as 25% of the neck spine injuries that result in permanent damage are caused by improper handling on the part of care givers.

**Question F** - The correct answers are 29, 30, and 32. If a rigid cervical collar is available it should be placed before moving the victim. If no collar is available, and the victim is in a side lying position, preparation for transport is as follows: Place a padded side board beside the injured. Straighten the victims limbs and log roll the victim onto the board using a four person technique, with the most experienced person holding the injured person's head. The head and neck must be kept in alignment with the body at all times. (See Figures 1 and 2.) If a blanket roll splint and cravats are being used, they may now be placed while gentle traction is applied to the head. The cravats are now tied as indicated in Figure 3. If available, sandbags and adhesive tape used in a similar manner are a superior method of immobilization for the head and neck. Finally the victim is strapped to the board, working from the head to the chest and down to the legs.

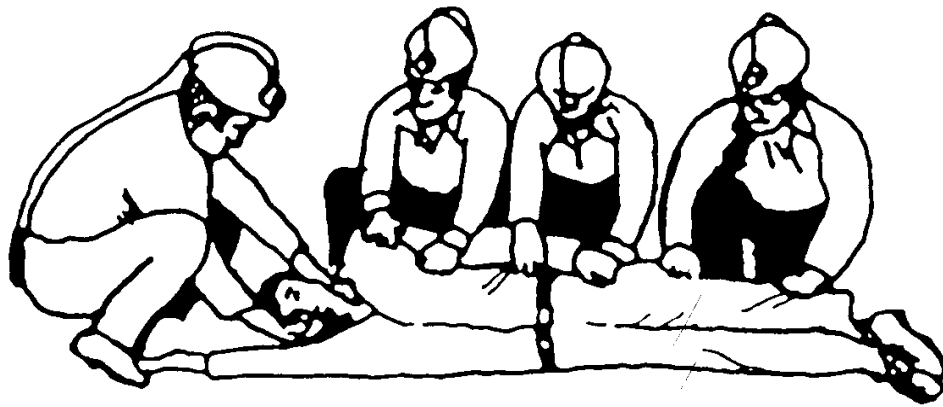


Figure 1: Log rolling the victim - first position

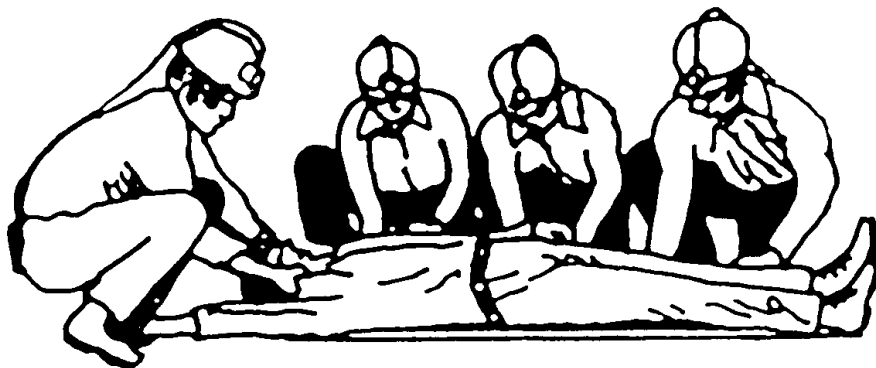


Figure 2: Log rolling the victim - final position



Figure 3: Immobilization of the head and neck with blanket roll and cravats

## References

- Bergeron, J. D. (1982). First responder. Bowie, MD: Robert J. Brady Co. (pp. 36-39, 179-181).
- Campbell, J. E. (1985). Basic trauma life support: Advanced prehospital care, Bowie, MD: Brady Communications Co, (pp. 59-71).
- McRae, J. T., Beamer, W. C., Griffin, A. M., (1985). Emergency medicine case studies. Seconded. Vol. 1 New Hyde Park, NY: Medical Examination Publishing Co. (pp. 150-154).
- Mine Health and Safety Administration. (1980). First aid book. Washington, DC: U. S. Department of Labor (pp. 6, 99, 152).
- National Conference on Cardiopulmonary Resuscitation and Emergency Care. (1986). Standards and guidelines for cardiopulmonary resuscitation (CPR) and emergency cardiac care (ECC) Part 11: Adult basic life support. Journal of the American Medical Association 255 (21), 2915-2932.
- Phillips, C., (1986). Basic life support skills manual (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall.
- Weiss, M. H. (1984). The injured patients' injured neck. Emergency Medicine, pp. 24-48.

## Scoring Key for Continuous Miner Accident

The correct answers are marked with an asterisk.<sup>4</sup>

Question	Answer Number				
A	1	2*	3	4	
B	5	6*	7*	8*	9*
C	10*	11*	12	13	14
D	15*	16*	17*	18*	19
	20*	21*	22*	23*	
E	24*	25*	26	27*	28
F	29*	30*	31	32*	33
F	32	33	34*	35*	

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<sup>4</sup> This page is printed in large type so that it may be copied and used as an overhead transparency.

## **Appendix A: Problem Booklet**

Duplicate this copy of the problem booklet for use in your classes. **Booklets should be printed on only one side of the paper.** Each person in your class should have a problem booklet while they are working the exercise. The problem booklets are reusable. To save time and money, ask the trainees to avoid marking in the booklets and collect all the booklets after the class.

You may obtain a copy of the problem booklet from NIOSH, Pittsburgh Research Laboratory, Pittsburgh, PA phone 412-386-5901, fax 412-386-5902 or email to [minetraining@cdc.gov](mailto:minetraining@cdc.gov).

## **Continuous Miner Accident**

### **Problem Booklet**



## **Instructions**

Read the problem described on the next page. Then answer the six questions. Do them one at a time. Don't jump ahead, but you may look back to earlier questions and your answers. Some questions direct you to choose only one answer unless you are told to "Try again!" Other questions tell you to select as many answers as you think are correct. Follow the directions for each question.

After you have selected your choice to a question, look up the number for that choice on the answer sheet. Rub the developing pen between the brackets for that choice. A hidden message will appear that tells you if the choice is correct and provide you with additional information. When you finish you will learn how to score your performance.

### Background

There are 8 entries being driven in 56 inch coal.

Eleven miners are on the section.

The portal is 20 minutes away by mantrip.

The mine phone is five minutes away.

You are the most experienced first aider on the section.

### Problem

You are operating a continuous miner at the face. Your helper, Harry Harlan, is working behind you. When you raise the boom you hear Harry cry out. After shutting down the miner you run back to find him lying on the mine floor. Meanwhile the shuttle car operator runs up shouting that he saw Harry crushed against the roof. (See Figures 1 and 2.) Harry is lying on his right side.

Now turn to **Question A** and begin.

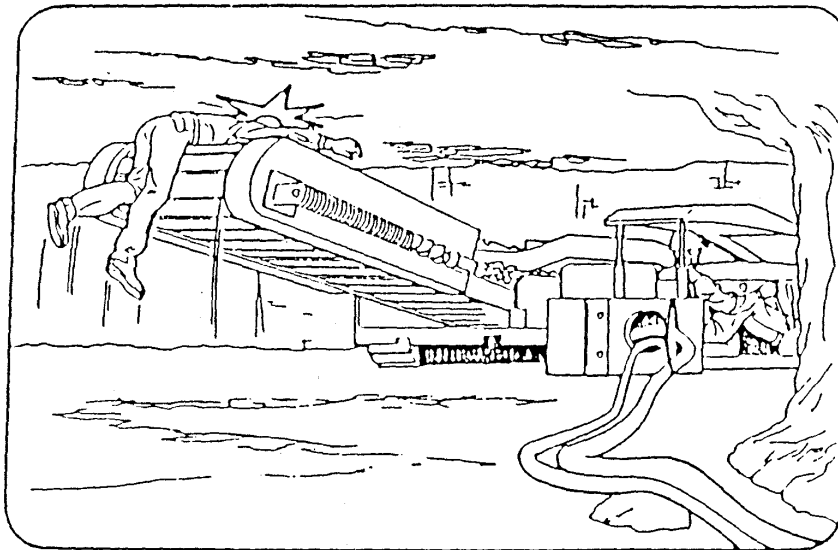


Figure 1: Harry crushed against the roof by boom of continuous miner

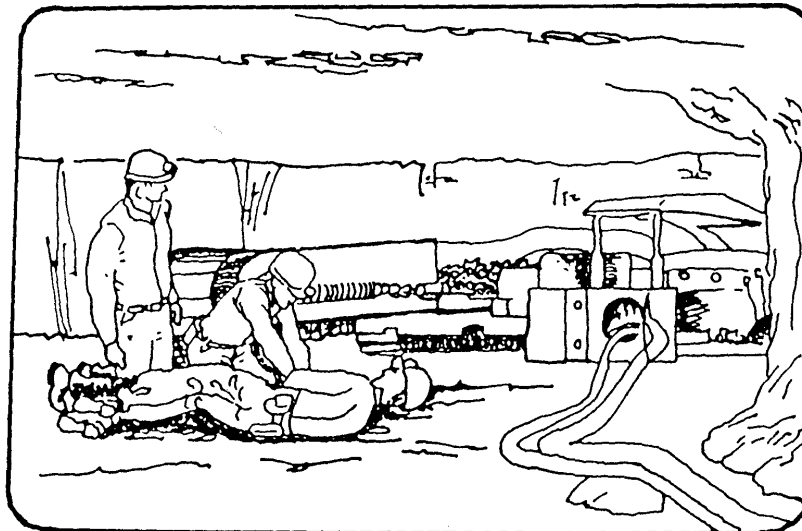


Figure 2: Harry lying injured on the mine floor

**Question A**

You yell for help. Harry is now lying with his feet in a puddle of water. In this situation the 1st thing you should do is: (Choose only ONE unless you are told to "Try Again!")

1. Try to find the face boss.
2. Check Harry's injuries.
3. Drag Harry to a drier place.
4. Send the shuttle car operator for the first aid kit.

**Question B**

Harry is lying on his side and you are checking him for injuries. How would you do this?  
(Select as MANY as you think are correct.)

- 5. Ask if he can sit up.
- 6. See if he is breathing.
- 7. See if he is bleeding.
- 8. See if he is conscious.
- 9. Feel his neck pulse.

**When you have made your selection(s) do the next question.**

### Question C

Three miners who heard your shouts come to help. You have made your initial check of Harry's injuries. He is lying on his side and moaning softly. What should you do for him now? (Select as MANY as you think are correct.)

- 10. Continue checking Harry's injuries.
- 11. Send one miner to call outside for help.
- 12. Ask Harry to sit up if he can.
- 13. Tell your buddies to move Harry to the closest mantrip.
- 14. Roll Harry onto his back, prop his legs up about a foot, and cover him with your jacket.

**When you have made your selection(s) do the next question.**

**Question D**

You continue to check Harry for injuries. How would you do this? (Select as MANY as you think are correct.)

- 15. Ask if he can wiggle his fingers and toes.
- 16. Ask if he is in pain.
- 17. Check his pulse rate.
- 18. Check his skin color.
- 19. Turn his head from side to side.
- 20. Gently feel his stomach area.
- 21. Gently feel his spine with your fingertips.
- 22. Look at his arms and legs.
- 23. Look at and apply gentle pressure to each side of his chest.

**When you have made your selection(s) do the next question.**

**Question E**

As you finish your checks one of your buddies arrives with a first aid kit, two blankets, and a stretcher board. What would you do for Harry at this time? (Select as MANY as you think are correct.)

- 24. Cover him with the blanket.
- 25. Immobilize his head and neck with a blanket roll.
- 26. Turn him onto his back and prop up his legs.
- 27. Tape a bulky dressing over the injured area of the chest.
- 28. Prop up his head and shoulders with a blanket to help him breath easier.

**When you have made your selection(s) do the next question.**



## Question F

One of your buddies returns and says that it will take at least 20 minutes before EMT's can reach the scene. You decide to move Harry to the portal by mantrip. Which of the following methods would you use? (Select as MANY as you think are correct.)

- 29. Gently but firmly hold Harry's head with both hands to keep it in line with his neck and body while the other crew members lift him onto the stretcher. Then immobilize him on his back.
- 30. Cover Harry with a blanket.
- 31. Lift Harry onto the stretcher in the position he was found (lying on his side).
- 32. Secure the blanket roll splint with cravats at the forehead and chin.
- 33. When immobilizing Harry, begin with his feet and legs. Then work up to his abdomen, chest, neck and head.

## END OF PROBLEM

### Scoring your performance

- 1. Count up the total number of responses you colored in that were marked "correct." Write this number in the first blank on the answer sheet.
- 2. Count the total number of incorrect responses you colored in. Subtract this number from 12. Write the difference in the second blank on the answer sheet.
- 3. Add the numbers on the first and second blanks. This is your score.

The best possible score of 33 results from selecting all the correct answers and no wrong answers. The worst possible score of zero results from selecting all the wrong answers and no correct answers.

## **Appendix B: Answer Sheet Blanks**

These are the answer sheet blanks. Copies of these blank answer sheets may be duplicated in the normal fashion. However, the answers that are found within the brackets must be printed on these blank answer sheets in invisible ink. These answers are found in Appendix C. If you have the ability to print invisible ink, make copies of the blank answer sheets, make a master of the answers that appear in Appendix C, and then print the invisible ink answers on the blank answer sheets. Be careful to make sure all pages print and that the appropriate answers line up with the appropriate blanks. The Master Answer Sheet shows all the answers in their proper place.

Most companies and trainers prefer to obtain preprinted answer sheets. These may be obtained from NIOSH, Pittsburgh Research Laboratory, Pittsburgh, PA phone 412-386-5901, fax 412-386-5902 or email to [minetraining@cdc.gov](mailto:minetraining@cdc.gov).

The exercise should be administered in small groups. You will need one answer sheet for each 3 to 5 persons in your class. The answer sheets are consumable. You will need a new set for each class.

Developing pens are also needed by each person who marks an answer sheet. These may be obtained from the A. B. Dick Company, P.O. Box 1970, Rochester, New York 14692, phone 1-800-225-4835.

## Answer Sheet for Continuous Miner Accident

Use this answer sheet to mark your selections. Rub the developing pen gently and smoothly between the brackets. Don't scrub the pen or the message may blur. Be sure to color in the entire message once you have made a selection. Otherwise you may not get the information you need.

**Question A** (Choose only ONE unless you are told to "Try Again!")

1. [ ]
2. [ ]
3. [ ]
4. [ ]

**Question B** (Select as MANY as you think are correct.)

5. [ ]
6. [ ]
7. [ ]
8. [ ]
9. [ ]

**Question C** (Select as MANY as you think are correct.)

10. [ ]
11. [ ]
12. [ ]
13. [ ]
14. [ ]

**Question D** (Select as MANY as you think are correct.)

- 15. [ ]
- 16. [ ]
- 17. [ ]
- 18. [ ]
- 19. [ ]
- 20. [ ]
- 21. [ ]
- 22. [ ]
- 23. [ ]  
[ ]

**Question E** (Select as MANY as you think are correct.)

- 24. [ ]
- 25. [ ]
- 26. [ ]
- 27. [ ]
- 28. [ ]

**Question F** (Select as MANY as you think are correct.)

- 29. [ ]
- 30. [ ]
- 31. [ ]  
[ ]
- 32. [ ]
- 33. [ ]

### Finding your score

Number of "Correct" answers you colored in (1) \_\_\_\_\_

12 minus number of incorrect answers you colored in (2) \_\_\_\_\_

Add blanks one and two to get your total score (3) \_\_\_\_\_

Highest possible score = 33

Lowest possible score = 0

## **Appendix C: Invisible ink Answers**

These pages contain the answers that must be printed in the blanks of the answer sheets in Appendix B. These answers are spaced and sequenced correctly so that they match up with the appropriate blanks on the answer sheet blanks.

Once the answers have been printed on the answer sheet blanks, the developing pen reveals the printed message.

You may prepare your own answer sheets or you may obtain preprinted answer sheets. To determine how many answer sheets and developing pens you will need, see the introductory section of the Instructor's Copy. Preprinted answer sheets may be obtained from NIOSH, Pittsburgh Research Laboratory, Pittsburgh, PA phone 412-386-5901, fax 412-386-5902 or email to [minetraining@cdc.gov](mailto:minetraining@cdc.gov).

Harry may need immediate help. Try again!

Correct! This will tell you if Harry needs immediate help. Do the next question.

This could cause further injury. Try again!

There are only two of you. Both may be needed to care for Harry. Try again!

This could cause further injury.

Correct! You see his belly move and you can feel air move at his mouth.

Correct! No bleeding is seen.

Correct! Harry is moaning and swearing quietly.

Correct! A rapid pulse is present.

Correct!

Correct! It is important to begin the mine emergency procedures.

This could cause further injury.

This could cause further injury.

This may cause further injury.

Correct! He says "OK", but there is no movement.

Correct! He says he feels numb.

Correct! Pulse 120 and weak.

Correct! He appears pale.

No! This could cause further injury.

Correct! Stomach area feels normal.

Correct! His lower neck spine feels deformed.

Correct! No abnormalities are seen.

Correct! Part of his left chest draws in when he inhales and moves easily when you apply gentle pressure.

Correct! This is done.

Correct! This is done.

This could cause further injuries.

Correct! This is done.

This could cause further injuries.

Correct! This is done.

Correct! This is done.

It is almost impossible to lift a victim lying on his side and keep the head and neck immobilized in a straight line. This could cause further injury.

Correct! This is done.

His head and neck should be immobilized first to prevent spinal injury.